OPTICAL PHENOMENA.

SOLAR HALOS.

Solar halos have been observed in the various districts on the following dates:

New England.—5th to 8th, 13th, 15th, 20th, 23d, 27th.

Middle Atlantic states.—3d, 4th, 5th, 7th, 8th, 10th, 12th, 15th, 17th, 18th, 20th, 23d, 25th, 27th.

South Atlantic states.—5th, 7th, 10th, 11th, 13th, 14th, 16th, 18th, 23d, 24th, 28th, 31st.

Eastern Gulf states.—3d, 4th, 13th, 21st.

Western Gulf states.—2d, 3d, 6th, 9th, 11th, 22d, 26th.

Tennessee.—3d, 13th, 16th, 17th, 27th.

Lower lake region.—4th, 7th, 10th, 12th, 15th, 18th, 22d, 23d, 27th.

Upper lake region.—1st, 2d, 4th, 5th, 7th, 9th to 12th, 15th, 19th, 22d, 25th, 31st.

Extreme northwest.—1st, 3d, 4th, 10th, 11th, 13th, 18th, 30th.

Upper Mississippi valley.—2d to 6th, 9th, 10th, 11th, 13th, 15th, 16th, 17th, 19th, 22d, 24th, 26th, 31st.

Missouri valley.—1st to 5th, 11th, 15th, 17th, 19th, 23d, 26th.

Northern slope—2d to 6th, 10th, 19th.

Middle slope.—1st, 3d, 4th, 5th, 9th, 10th, 16th, 19th, 21st, 25th, 26th, 30th.

South Pacific coast region.—3d, 4th, 6th, 7th, 10th, 18th, 19th, 24th.

Solar halos were also observed at the following statlons not included in the districts named above:

Fort Apache, Arizona, 9th.
Prescott, Arizona, 15th.
Oakland and Sacramemto, California, 7th.
Carson City, Nevada, 18th.
College Hill, Ohio, 9th, 15th.
Roseburg, Oregon, 18th.
Nephi, Utah, 24th.

LUNAR HALOS.

Lunar halos have been observed in the various districts on the following dates:

New England.—4th to 8th, 10th, 12th, 14th to 17th, 31st.

Middle Atlantic states.—3d to 13th, 16th, 17th, 18th, 23d.

South Atlantic states.—2d, 3d, 4th, 6th to 11th, 13th, 14th, 15th

Eastern Gulf states.—4th, 6th, 7th, 9th, 12th.

Western Gulf states.—5th to 13th, 15th.

Tennessee.—3d, 5th, 6th, 9th, 10th, 13th, 14th, 16th, 17th.

Ohio valley.—3d, 6th, 7th, 9th, 11th to 16th, 18th.

Lower lake region.—7th, 11th, 12th, 22d.

Upper lake region.—3d, 4th, 5th, 7th to 12th, 14th to 17th.

Extreme northwest.—2d, 3d, 4th, 7th, 8th, 10th, 11th, 16th, 31st.

Upper Mississippi valley.—3d to 17th, 19th.

Missouri valley.—1st, 3d, 4th, 9th, 10th, 11th, 13th, 14th, 16th, 23d.

Northern slope.—4th, 7th, 8th, 9th, 11th, 13th, 22d.

Middle slope.—4th, 9th, 13th, 16th, 21st.

Southern plateau.—3d, 5th to 10th, 19th, 20th, 22d.

Middle plateau.—4th to 7th, 11th, 13th.

North Pacific coast region.—7th to 11th, 17th.

Middle Pacific coast region.—7th, 9th, 19th.

South Pacific coast region.—5th, 6th, 7th, 19th.

Lunar halos were also observed at the following stations not included in the districts named above:

Cedar Keys, Florida, 3d.
Lewiston, Idaho, 7th.
Brownsville, Texas, 15th.
Fort Davis, Texas, 4th.
Fort Stockton, Texas, 3d.

MIRAGE.

Sussex, Waukesha county, Wisconsin.—At 7 p. m. of the 7th the hills south of Pewaukee lake appeared in inverted positions at an altitude of three hundred feet.

Webster, Day county, Dakota.—On the morning of the 30th distant objects below the horizon were apparently lifted into the range of vision.

Mirage was also observed at the following stations:

Pretty Prairie, Kansas, 2d, 9th, 11th, 12th, 13th, 17th, 21st, 22d, 24th, 28th, 30th.

Genoa, Nebraska, 9th, 12th, 22d, 25th.

Indianola, Texas, 6th, 8th, 9th, 14th.

MISCELLANEOUS PHENOMENA.

The phenomenal sunrises and sunsets, so extensively reported during the previous months, were also observed during January. From the reports received, it appears that, upon the whole, the displays of January were not so brilliant as those of October, November, and December, although some observers report that those occurring in January were the most brilliant seen at any time since the first appearance of the phenomenon. The reports at hand show the general characteristics of the January displays to be the same as those of the past months, heretofore published in the REVIEW.

In the following summary are given, principally, the dates on which the phenomenon was observed in the several states, with brief descriptions of some of the more important displays:

Alabama.—Auburn: red skies on the evenings of the 20th, 21st, 22d.

Mobile: at sunset, and for one hour thereafter, on the 20th, the eastern horizon was of a bright red color, extending upward 35°. In the west the light rose to an altitude of from 60° to 80°. The colors were so bright that the reflection caused white buildings to assume a pink shade. This display was, by far, the most brilliant of the many beautiful sunsets observed during the last three months. The colors in the western sky remained for more than one hour, and then gradually faded away.

Arizona.—Fort Bowie: red sunsets on the 4th and 12th; on the 27th a brilliant, red light remained visible in the western sky for two hours after sunset.

Arkansas.—Lead Hill: the brilliant sunsets observed since September, were also observed on January, 3d, 24th, 28th, and 31st, the displays becoming less brilliant toward the last of the month.

Little Rock: the sky was of lurid color to an altitude of 80° after sunset on the 2d.

Fort Smith, 22d: the western horizon, though partially obscured by the clouds, was illuminated with red, in places. On the morning of the 26th one-fourth of the eastern sky was of a beautiful red color.

California.—Hydesville, Humboldt county: red skies at sunset from the 10th to 17th, 19th, 21st, 23d, 26th, 28th, 29th, 30th; and at sunrise on 12th, 14th to 17th, 22d, 30th. The unusual colors in the sky before sunrise and after sunset continued on the dates given above, the displays on evenings of the 14th and 15th being the brightest.

Fall Brook: bright after-glow on the 12th. On the 13th, while the usual sunset glow was fading, an arc of salmon color formed above it at an altitude of 25°, from which streamers radiated to an altitude of 45°. A band of pale indigo color separated it from the normal sunset glow beneath, giving the display the appearance of the aurora. The arc rapidly moved toward the horizon, and a second arc formed above it at an altitude of 35°, which sent out streamers, pointing downward toward the common centre and nearly meeting those still visible on the lower arc. The phenomenon was of short duration having disappeared twenty minutes after sunset, leaving the western horizon illuminated with a uniform tint which continued for one hour.

Oakland: bright sunrises and sunsets were observed during the entire month.

Los Angeles: bright sunsets, 16th to 19th, 21st, 22d, 23d.

Colorado.—Golden: beautiful, glowing tints were observed in the eastern and western skies before and after sunset during the greater part of the month.

Fort Collins: red sunsets, 12th, 15th, 16th, 17th; red sunrises, 17th, 21st, 22d, 28th, 29th.

Dakota.—Yankton: at sunset on the 12th the entire western sky was tinged with yellow, and on the evenings of 20th and 27th about four-tenths of the sky was tinged with the same color.

Bismarck, 21st: for two hours after sunset the sky presented a red appearance; on the 23d the sky was of a bright red color for one and one-half hours after sunset.

Fort Totten: red sunsets, 20th, 21st.

Alexandria: rosy sunsets, 16th, 20th, 21st, 28th; rosy sunrises, 17th, 21st, 24th.

Florida.—Archer: red sunrises, 1st, 3d; red sunsets, 3d, 6th, 13th, 18th, 19th.

Newport: red sunsets, 5th, 7th, 20th, 30th.

Jacksonville: very brilliant sky at sunset on the 6th and 12th.

Pensacola: at sunset of the 12th one-fourth of the western sky was of a bright red color; 20th, the whole western sky assumed a succession of tints; the eastern sky before sunrise, and the western sky after sunset, on the 21st exhibited a variety of luminous colors.

Georgia.—Andersonville, Sumter county: unusually bright sunsets on the 3d, 22d, 23d, 27th, 29th, the sunrises of 22d, 23d, and 27th being of similar appearance.

Augusta: brilliant evening twilights on the 19th, 20th, 29th, and 30th.

Illinois.—Rockford: red glow at sunrise and sunset on all clear days of the month.

Cairo: remarkably bright sunsets on 20th, 21st, 24th.

Indiana.—Fort Wayne: beautiful sunset on the 8th.

Sunman: red sunsets on all clear days of the month.

Indian Territory.—Cantonment: a pinkish haze extending to an altitude of 45° from the western horizon was observed on the evening of the 4th.

Iowa.—Independence, 17th: brilliant red light in the east before sunrise, first changing to yellow and then to green, brilliant sunset on same date.

Cresco: red sunrises and sunsets on 15th and 17th.

Muscatine: red sunsets, 8th, 15th, 17th, 20th, 24th, 25th, 26th; red sunrises, 3d, 9th, 17th, 26th.

Oskaloosa: red sunsets, 12th, 15th.

Davenport: deep red colors in western sky at sunset of 10th.

Kansas.—Wellington: the display following sunset was observed throughout the entire month, the glow increasing in brilliancy from the 18th to 25th.

Allison: unusually brilliant sunset glows on 1st, 13th, 22d.

Pretty Prairie, Reno county: red skies after sunset, 2d, 10th to 16th, 19th to 24th, 27th, 29th.

Kentucky.—Bowling Green: brilliant sunsets during greater part of the month.

Maine.—Eastport: on the evenings of the 5th and 6th, a red glow was visible in the western sky for one hour after sunset.

Cornish: bright sunsets, 5th, 6th, 7th.

Massachusetts.—Somerset: red sunsets, 9th, 17th, 26th; red sunrise, 10th.

Taunton: ruddy sunsets, 17th, 24th, 28th.

Princeton: red sunset, 21st.

Michigan.—Grand Rapids: gaudy sunsets on every clear day during the month.

Manistique: sky very red for one hour after sunset on 7th; very brilliant on 31st.

Lansing: brilliant sunset, 8th.

Minnesota.—Hastings: brilliant sunrises and sunsets of yellow, rose, and red colors were observed on all clear days of the month.

Saint Paul: unusually bright sunsets on 10th, 21st.

Saint Vincent: bright sunset displays on 19th, 20th, 21st.

Nebraska.—Red Willow: bright red glow before sunrise on 9th, 12th, 20th, 21st, 28th; and after sunset on the 12th.

Stella: red sunsets on 15th, 16th.

North Platte: beautiful sunrises on the 24th, 28th, and 29th.

New Jersey.—Barnegat City: the sunset of the 3d surpassed in brilliancy any that have been previously observed.

New Mexico.—Fort Stanton: a reddish glow in the western sky at sunset on the 8th and 11th.

New York.—North Volney: bright sunset displays, 2d; and at Auburn on 6th and 17th.

North Carolina.—Brevard: brilliant twilights on 9th, 12th, 19th, 22d, 25th, to 29th.

Ohio.—Portsmouth: beautiful sunsets on 5th, 20th, 21st.

Wauseon: brilliant sunrise and sunset on 20th.

Sandusky: bright, red sunset on 13th.

Oregon—Lake View: bright, red sunset, 15th, 22d.

Pennsylvania.—Leetsdale: the peculiar redness of the sky after sunset was frequently observed during the month.

Quakertown: red sunsets, 17th, 20th, 25th, 26th, 28th.

Tennessee.—Knoxville, 26th: the western sky was unusually red at sunset. This phenomenon has been observed on every clear evening for the last two months, but the display of this date was the most brilliant observed during that time.

Chattanooga: 9th, brilliant sunrise; 20th, brilliant sunset.

Nashville: very bright sunsets on 12th, 20th, 21st, 29th; very bright sunrises on 13th, 30th.

Austin: remarkably red sunset on 5th.

Texas.—Galveston: beautiful sunsets were observed on the 19th and 20th, on the latter date the eastern sky before sunrise presented the same peculiarities.

Utah.—Salt Lake City: the sunset of the 16th was very beautiful; an intense glow of bright red overspread the sky, which continued for several minutes after sunset.

Vermont.—Strafford: red sunsets on the 25th, 26th; red sunrise on 27th.

Virginia.—Lynchburg: brilliant sunsets on 19th, 21st, 29th.

Washington Territory.—Bainbridge Island: beautiful sunsets 13th, 14th, 31st.

Olympia: after sunset on the 13th the western sky was of a fiery red color.

Wisconsin.—Wausau: on clear days before sunrise, and after sunset, an unusual light appeared in the skies. The phenomenon usually made its appearance in the morning about three-fourths of an hour before sunrise, the sky assuming an orange color, which gradually faded into a yellow light.

Manitowoc: beautiful sunsets on nearly every evening, the colors sometimes extending over nearly the whole horizon.

Sussex: green sunrise on 7th; red sunset on 15th.

La Crosse, 30th: the western sky was of deep red color at sunset, while at the same time the eastern sky was of a deep purple. These colors were visible for more than one hour.

Wyoming.—Cheyenne: very bright sunsets were observed on the 12th and 15th.

SUN SPOTS.

Professor David P. Todd, director of the Lawrence Observatory, Amherst, Massachusetts, furnishes the following record of sun spots for January, 1884:

Date—Jan., 1884.	No. of new		Disappeared by solar rotation.		Reappeared by solar rotation.		Total No. visible.		Remarks.
	Gr'ps	Spots	Gr'ps	Spots	Gr'ps	Spots	Gr'ps	Spots	
3, 12 m	.....	.....	.....	.....	.....	10‡	7	50‡	
4, 10 a. m.	2	10‡	1	5	2	10‡	8	55‡	
4, 1 p. m.	0	0	0	0	0	0	8	55‡	
5, 3 p. m.	1	5‡	1	2	1	5‡	8	60‡	
6, 1 p. m.	0	10‡	0	0	0	0	8	70‡	
10, 9 a. m.	.....	.....	.....	.....	.....	.....	9	120‡	
16, 8 a. m.	.....	.....	.....	.....	.....	.....	5	40‡	
17, 10 a. m.	0	5‡	1	1	0	0	4	45‡	
20, 2 p. m.	.....	.....	.....	.....	.....	.....	5	45‡	
21, 10 a. m.	0	0	2	5‡	0	0	3	35‡	
22, 8 a. m.	1	1	0	0	1	1	4	35‡	
23, 10 a. m.	1	2	0	10‡	1	2	5	20‡	
26, 8 a. m.	2	25‡	.....	.....	.....	.....	5	40‡	
27, 11 a. m.	1	5	0	0	1	5	6	45‡	

Faculæ were seen at the time of every observation. ‡Approximated.

Mr. H. D. Gowey, of North Lewisburg, Champaign county, Ohio, reports that during January, 1884, sun spots were least

numerous on the 3d; most numerous on 25th; largest on the 31st, and smallest on the 1st.

SUNSETS.

The characteristics of the sky, as indicative of fair or foul weather for the succeeding twenty-four hours, have been observed at all Signal Service stations. Reports from one hundred and sixty stations show 4,901 observations to have been made, of which six were reported doubtful; of the remainder, 4,895, there were 4,184, or 85.5 per cent., followed by the expected weather.

EARTHQUAKES.

Portland, Oregon.—A light shock of earthquake occurred at 8.40 p. m. of the 3d. Its duration was about two seconds; vibration from southeast to northwest.

Los Angeles, California.—At 11.56 a. m. of the 4th a slight shock of earthquake was felt. Owing to its short duration the vibration was not determined.

Wilmington, North Carolina.—A slight shock of earthquake was felt at about 8 a. m. of the 18th. The shock was very perceptible, causing crockery, etc., to shake. Reports from Fort Macon and Beaufort state that the shock was also felt at those places but somewhat earlier than at this place. The duration of the shock at Wilmington is estimated at from eight to thirty seconds.

New River Inlet, North Carolina.—Two distinct shocks of earthquake were felt in this vicinity at 8.30 a. m. of the 18th. The shocks were separated by an interval of about two minutes, and were sufficient to displace crockery and to cause buildings, trees, etc., to vibrate.

Fort Macon, North Carolina.—At about 7.50 or 7.55 a. m. of the 18th two slight shocks of earthquake were felt here and at Beaufort. The direction of the shocks was from southwest to northeast. They were of from three to four seconds duration and accompanied by a rumbling sound.

Contoocook, Merrimac county, New Hampshire.—A violent earthquake shock occurred at 2 a. m. of the 18th. It was felt throughout this region.

Hydesville, Humboldt county, California.—Two shocks of earthquake occurred on the 27th. The first, a sharp shock, was felt at 11.30 p. m., and the second, a very light one, followed about five minutes later. They were preceded and followed by a roaring sound.

Eureka, Humboldt county, California.—A severe shock of earthquake was felt in this city at 11.30 p. m. of the 27th. The vibrations, which were somewhat prolonged, were from north to south.

Cape Mendocino, California.—A severe earthquake occurred at 11.30 p. m. of the 27th. Three shocks were felt, the interval between the first and second being only an apparent lull, while six minutes intervened before the third shock occurred. The second shock was the most violent, being sufficient to shake buildings perceptibly and to displace light articles, etc. The direction was reported by some persons to be east and west, while to others it appeared to be north and south.

Saint John, New Brunswick.—Three distinct shocks of earthquake were felt at Rothesay, about nine miles from here, on the 29th.

The following extract is taken from the "New York Tribune" of January 27, 1884:

WASHINGTON, January 26.—Assistant George Davidson telegraphs the superintendent of Coast and Geodetic Survey, from San Francisco, that at 7 hours and 24 minutes last evening earthquake waves were indicated by the delicate levels of the astronomical instruments of the observatory. The amplitude of each vibration was three seconds of arc, in six seconds of time, and they continued for twenty minutes.

METEORS.

Variety Mills, Nelson county, Virginia.—At 10.45 p. m. of the 2d a meteor was observed moving slowly from the head of "Ursa Minor" in a southwesterly direction at an altitude of about 35°. It was visible about eight seconds and left behind it a trail of light, its path being about 80° in length.

Los Angeles, California.—At 8.17 p. m. of the 6th a bright meteor shot across the sky in a northeasterly direction, leaving a trail of bright light. At its disappearance no cloud was seen or explosion heard.

Saint Vincent, Minnesota.—On the evening of the 21st a meteor was observed in the northern sky. It made its appearance at 7.30 p. m., and during its flight changed its brilliancy, first fading and again becoming very bright. It passed from east to west, and was followed by a cloud at its disappearance.

Little Rock, Arkansas.—A very brilliant meteor of violet color, passing from southeast to northwest, was observed during the evening of the 25th.

Mobile, Alabama.—A large meteor, moving rapidly in a southerly direction from a point a little north of the zenith, was observed at 5.40 p. m. of the 6th. When near the horizon it exploded into many fragments, but no report was heard. The meteor was apparently about two-thirds the size of the full moon, and the light produced was sufficiently bright to cast shadows.

Meteors were also observed at the following places:

2d and 3d.—Lead Hill, Arkansas.
16th.—Mountainville, New York; Taunton, Massachusetts.
17th.—Davenport, Iowa.
20th.—Crete, Nebraska; Woodstock, Maryland.
21st.—Lead Hill, Arkansas.
22d and 23d.—Portland, Maine.
24th.—Manhattan, Kansas.
25th.—Readington, New Jersey.
26th.—Mobile, Alabama.
28th.—Lead Hill, Arkansas.
30th.—Brevard, North Carolina; Wytheville, Virginia.

ZODIACAL LIGHT.

Prescott, Arizona, 23d, 27th.
Webster, Dakota, 1st to 8th, 10th, 13th, 14th, 20th, 21st, 23d, 24th, 25th, 27th, 28th, 30th, 31st.
Archer, Florida, 14th, 15th, 18th, 19th, 22d, 31st.
Wabash, Indiana, 24th.
Cresco, Iowa, 14th, 15th, 23d, 24th.
Humboldt, Iowa, 19th.
Allison, Kansas, 20th, 21st, 23d, 24th, 26th.
Cambridge, Massachusetts, 16th, 18th, 21st, 26th, 27th.
Rowe, Massachusetts, 25th.
Escanaba, Michigan, 3d, 5th, 7th, 14th, 20th, 23d, 24th, 26th, 31st.
Brevard, North Carolina, 19th, 22d, 26th, 28th.
Albany, Oregon, 21st, 22d, 23d, 29th, 30th, 31st.
Haverford College, Pennsylvania, 17th, 26th.
Point Judith, Rhode Island, 26th.
Stateburg, South Carolina, 20th, 21st, 26th, 30th.
Nashville, Tennessee, 13th, 20th, 21st, 22d, 26th, 29th.
Variety Mills, Virginia, 21st, 22d.
Sussex, Wisconsin, 17th to 24th.

POLAR BANDS.

Lead Hill, Arkansas, 2d, 5th, 8th, 12th, 20th, 21st.
Los Angeles, California, 2d, 3d, 8th.
Archer, Florida, 2d, 4th, 2th, 17th, 19th, 31st.
Guttenberg, Iowa, 14th.
Yates Centre, Kansas, 5th, 11th, 23d, 31st.
Gardiner, Maine, 13th, 25th.
Escanaba, Michigan, 16th.
Clear Creek, Nebraska, 26th.
North Platte, Nebraska, 29th,
Moorestown, New Jersey, 4th.
Vineland, New Jersey, 12th, 13th.
Wauseon, Ohio, 4th, 7th, 13th, 17th, 22d, 24th, 25th, 26th.
Portland, Oregon, 15th.
Nashville, Tennessee, 13th.
Rio Grande City, Texas, 12th.
Variety Mills, Virginia, 2d.
Wytheville, Virginia, 3d, 6th, 10th.

MIGRATION OF BIRDS.

Geese flying southward.—Mobile, Alabama, 14th; Cairo, Illinois, 5th, 23d, 24th, 28th; Fort Madison, Iowa, 30th; Yates Centre, Kansas, 3d; New River Inlet, North Carolina, 2d; Point Judith, Rhode Island, 5th. *Flying northward.*—Red Bluff, California, 19th; Holton, Kansas, 29th; Leavenworth, Kansas, 13th; Portland, Oregon, 27th. *Flying eastward.*—Manhattan, Kansas, 5th. *Flying westward.*—Yates Centre, Kansas, 17th.

Ducks flying northward.—Sacramento, California, 13th, 15th to 18th; Cantonment, Indian Territory, 3d; Holton, Kansas, 29th; Indianola, Texas, 30th, 31st. *Flying southward.*—Mobile, Alabama, 4th.

Brents flying northward.—Indianola, Texas, 31st.

DROUGHT.

Red Bluff, California, 31st.—It is estimated that the recent rains benefited this county alone to the extent of more than $500,000. Before the rains many farmers had stopped ploughing and seeding on account of the drought. Sheep raisers were compelled to kill the young lambs, there not being sufficient water for both the sheep and lambs. The late rains have insured good crops of grain and wool.

PRAIRIE AND FOREST FIRES.

Cantonment, Indian Territory, 13th.
Reno, Indian Territory, 13th.
Dodge City, Kansas, 13th.
Fort Stockton, Texas, 27th, 29th.
Indianola, Texas, 20th.

NOTES AND EXTRACTS.

Hon. A. J. McWhirter, Commissioner of Agriculture for Tennessee, and director of the weather service of that state, in his report for January, 1884, furnishes the following:

The following report is based on returns from forty-three (43) stations, distributed as follows: Twelve in the eastern, nineteen in the middle, and twelve in the western division.

The mean temperature for the month was 29°.45, 13°.42 below that for December, and several degrees below the January mean of many years past. Indeed, a generally lower temperature has not been recorded for the past twenty years. The lowest point recorded was 16° below zero, at Knoxville. As low as 14° below zero was reported from two other stations, the general minimum being from 5° to 10° below zero. The maximum temperature during the month was 74°, reported from Darnall, in Lake county. The range of temperature was 90°, the greatest during the year, and 24° greater than that for December.

The highest temperature was recorded about the 1st and 30th, and the lowest about the 5th, 6th, and 25th.

The mean depth of rainfall was 6.55 inches, 2.24 inches greater than that for December. This amount appears small when the number of rainy days and the depth of snow are considered. It is much smaller than the precipitation of January, 1882, which was almost unprecedented. The month was one of rain and snow, only four or five days being reported without rainfall in some parts of the state. The days on which rains were general were the 1st, 7th, 11th, 14th, 18th, 19th, 23d, 24th, and 31st. The heaviest rainfalls occurred on the 31st, 14th, and 24th, in the order named. The greatest precipitation was 14 inches, reported from McMinnville, and the least was only .80 of an inch, reported from Darnall. There may be some slight inaccuracies in the measurement of the fall of snow in some instances, on account of the want of proper care being taken in measuring the actual depth of the snow and in melting it. By reference to the "Instructions to Observers" it will be seen that no little care is required to make an accurate measurement.

The feature of the month was the unusual amount of snow-fall, the fall at some stations being as much as 22 inches. The first and heaviest fall of the month was in the early part—about the 5th–7th—and was accompanied by the abnormally low temperature. The average depth of the fall during the month was 11.71 inches, the greatest that has been recorded for many years.

The ground was frozen throughout the state on several days during the month. Special mention was made from Dyersburg on the 5th, 6th, and 7th, of 4 inches; at McKenzie, 14 inches on the 26th, at which time ice formed in the centre of oak trees sixteen inches in diameter; at Hurricane Switch, on the 3d to the 14th, inclusive; the 16th and 17th; the 19th to the 23d, inclusive; the 25th to the 29th, inclusive; at Howell, on the 7th, 4.50 inches; at Florence Station, on the 6th, 4 inches; at Riddleton, on several days, the depth varying from 1.50 to 13 inches, the latter on the 6th; and at Grief, on the 5th and 6th. * * * * *

A new table has been introduced in this report, and will be a feature in future reports, giving the daily rainfall at each station during the month; also a table of the rainfall and temperature at the four principal stations in the state for the month of January for a number of years past. These tables will no doubt prove valuable for reference, and observers are specially requested to note carefully the days on which the rainfall occurs; also the exact amount of the fall each day. * * * * *

The Commissioner is gratified to announce that, through the kind co-operation of Gen. W. B. Hazen, Chief Signal Officer, he has been able to procure a number of rain gauges to be distributed throughout the state, thereby securing in the future a more accurate estimate of the precipitation each month. * * * * * *

Average number of clear days, 5.4.
Average number of fair days, 7.
Average number of cloudy days, 18.6.
Average number of days on which rain or snow fell, 10.8. * * *
Prevailing direction of wind, north. * * * *

The following extract is reprinted from the January report of the "Ohio Meteorological Bureau," Professor T. C. Mendenhall, director:

The meteorological conditions during the month were, on the whole, quite exceptional. The maximum barometric height was reached at Canton on the 26th, the record being 30.83 inches. This is the highest reading reported to the bureau since its organization. The range of the barometer was greater than for any month of the past year.

The precipitation was also considerably in excess of that of last year, much of it being in the shape of snow. In some portions of the state the depth of snow was unusual. In Marietta it was twenty-two inches, which is reported as being the deepest snow since the year 1818.

But the most remarkable feature of the weather of the month was the extremely low temperature which was reached on several days and at nearly all observing stations. The mean temperature for the month for the entire state was 19°.4, being nearly 5° lower than for January of last year. The maximum temperature observed, at Cincinnati on the 30th, was 59°.7, being only slightly less than the maximum for the same month of last year. The minimum temperatures recorded on several occasions were much lower than any of last year. There were three distinct and severe depressions of temperature during the month. The first began about the 3d and lasted four or five days. During at least two days of these every observer reported temperatures below zero. The greatest cold of this wave was on the 6th, the minimum observed at Wauseon being 24°.6 below zero; the mean minimum over the whole state was 15°.8 below zero. The second cold wave was of shorter duration, and showed its strength on the 21st. Although the depression was greater than in the first, this second wave was more limited in its area, being restricted in its severity to a belt running east and west through the central part of the state. The mean minimum was, therefore, not equal to that in the first case, being 11°.1 below zero. The lowest temperature observed was 31° below zero at the Ohio State University. The third wave began to be felt in the northern and western portions of the state on the 24th, and reached its greatest severity on the 25th at nearly all stations, but in one or two instances the minimum was not reached until the 26th. This was much the most remarkable depression of the month. The mean minimum was 19°.8 below zero; the lowest point was reached at Sidney. Some of the extreme temperatures reported on the 25th were as follows: Sidney, —34°; Ohio State University, —32°; Wauseon, —31°.7; Junction, —30°.5; Levering. —29°.2; Logan, —29°; Westerville, —28°. It is believed that these temperatures are entirely unprecedented in the history of this state, there being no meteorological records known to the writer which show such extreme cold in Ohio. Mr. Mikesell, who has observed for many years at Wauseon, which easily ranks as the coldest station in the state, reports that the lowest temperature ever known there previous to that of the 25th was 29°.2 below zero, observed January 29, 1873. * * *

SUMMARY OF REPORTS FOR THE STATE.

Mean, barometer 30.20; highest barometer, 30.83, on the 26th, at Canton; lowest barometer, 29.48, on the 2d, at Wauseon; range of barometer, 1.35.

Mean relative humidity, 82.6 per cent.

Mean temperature, 19°.4; highest temperature, 59°.7, on the 30th, at Cincinnati; lowest temperature, —34°.0, on the 25th, at Sidney; range of temperature, 93°.7; mean daily range of temperature, 18°.9; greatest daily range of temperature, 48°, on the 25th, at Sidney; least daily range of temperature, 2°.1, on the 1st, at Cincinnati.

Average number of clear days, 6.4; fair days, 8.2; cloudy days, 16.4; days on which rain fell, 14.

Mean monthly rainfall for the state, 2.72 inches; average daily rainfall, 0.09 inch; greatest monthly rainfall, 5.61 inches, at Marietta; least monthly rainfall, 1.39 inches, at Junction.

Prevailing direction of the wind, southwest.

The above summary is compiled from the reports of observations made at twenty-seven stations.

Mr. S. R. Thompson, director of the "Nebraska Weather Service," furnishes the following report, based upon reports from thirty-two stations:

BULLETIN FOR JANUARY, 1884.

Rainfall.—The average by sections was as follows: Southeast, 0.64 inch; northeast, 0.88 inch; southwest, 1.22 inches; northwest, 0.38 inch.